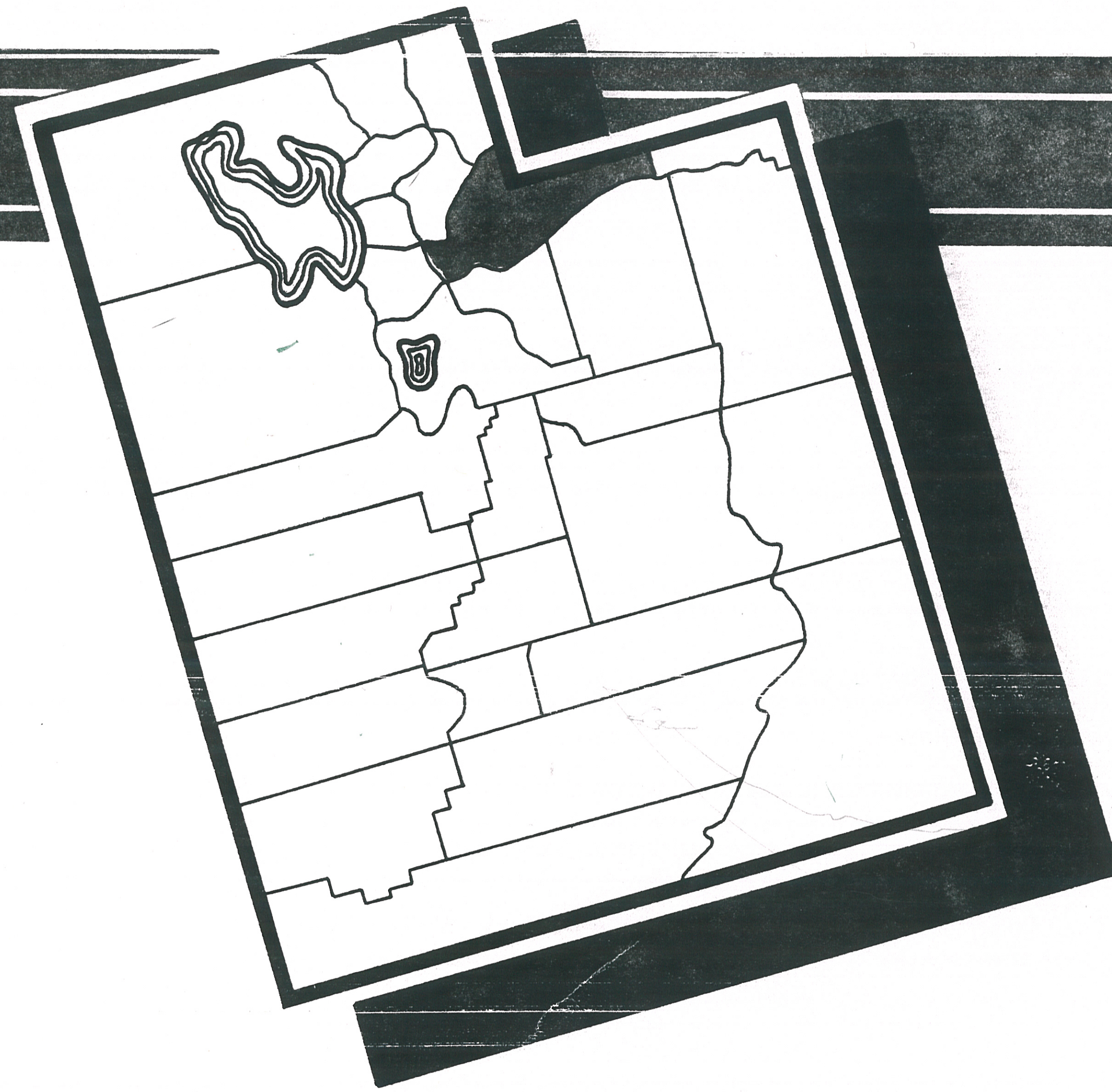


MATERIALS INVENTORY

SUMMIT COUNTY

DISTRICT TWO
MATERIALS SECTION
UTAH STATE
DEPT OF
HIGHWAYS

- POTENTIAL SOURCES
- PIT LOCATIONS
- TEST DATA
- GEOLOGY

MATERIALS INVENTORY

Purpose

The purpose of the Materials Inventory is threefold. First, it enables the Utah State Department of Highways to more accurately locate, investigate, and catalog the materials needed for highway construction. Second, it makes possible a system by which an accessible, permanent, and up-to-date record may be kept on every materials site that is now owned or will be purchased or optioned by the Department of Highways. Third, it makes possible the establishing of map and file records of the known materials sites in the State, other than those owned or optioned by the State.

The inventory is extremely valuable in eliminating the wasteful duplication of work that is now common in locating materials sites. General information on known materials sites and prospective sites will now be available on a county basis in booklet form. More detailed information is available from a central file in the Materials Inventory Section of the Materials Division and in the respective District Materials Sections.

Notwithstanding the enormous quantities of road-building materials that are now available in the State, it must be realized that one day these materials may be depleted or completely unobtainable due to the encroachments of man. As highways improve, the quality of materials that are used in highway construction must also improve. Good quality material is not readily available in all places, and this fact alone makes it necessary to locate and secure choice sites before they are depleted or become unobtainable. The recent advent of the Federal Highway Program has further emphasized the necessity for large quantities of high quality material for highway construction. This program has pointed up to the Department of Highways its many shortcomings in exploration procedures, the knowledge of what is available, and the foresight to organize and tabulate this information. The Materials Inventory is designed to remedy this situation.

Procedures

The Materials Inventory functions in the following manner. The initial step is to locate, evaluate, and record all pertinent data on each known materials site in the District. Form MI-1, entitled "Preliminary Materials Survey" (see fig. 1), is especially designed for the collection of the initial materials inventory data while in the field. The information contained on this form includes approximate grading, type of material, type of deposit, rock type by the pebble-count method, surface conditions of the site and area (indicating obstructions to excavation, etc.), impurities in the material (sand lenses, clay lenses, cementation, etc.), accessibility of site, quantity and quality of material, site number, ownership, and location of site. Form MI-1 will be filed in the central file and the district file. While visiting each site the investigator collects a representative sample of the material and laboratory tests are later conducted on this sample to determine its suitability for highway construction.

To aid in the search for potential sources of material, the Materials Inventory Section has outlined on the "General Highway Maps" the location of bedrock and the location of unconsolidated sediments (see Pit Locations and Potential Sources Map). These maps are a combination of geologic and soil-survey maps and are complete in as far as information is available. As more work is done with the unconsolidated sediments in the valleys, these maps will become increasingly more accurate. The chief value of these maps at the present time is to enable those who are searching for construction materials to narrow their field of exploration to those areas which are most promising. Since these maps show the location of known materials sites as well as the geology, they will enable an investigator to determine what relationships exist between the bedrock geology, the valley-fill sediments, and the known site. By recognizing these relationships, the investigator should be able to predict other possible materials sites. In addition, as these maps increase in detail they may well become valuable in highway location and planning.

Some of the information obtained by testing the representative sample taken from each known site or potential site is transferred to a general Test Data Sheet. This sheet includes tests conducted on the representative samples from each known site or potential site in a county. The data sheet accompanies the Pit Locations and Potential Sources Map in the booklet published on each county.

A permanent file contains all of the available and current detailed information concerning an individual site. A special form, MI-2 "Materials Source Data" (see fig. 3), is used to record and keep up to date all of the information concerning a materials site. This form contains all of the information on the Test Data Sheet and the Preliminary Materials Survey card, plus a complete layout of the materials site, logs of all test borings, all tests conducted on the material at the site, and other pertinent information.

The MI-3 form, "Pit Evaluation Report" (see fig. 2), constitutes one of the methods by which the Materials Source Data form and the inventory is kept up to date. This evaluation form is filled out by the Project Engineer or by the district materials personnel after a pit has been used for a project and is then submitted to the Materials Inventory Section. The evaluation form contains questions to be answered which will enable the materials inventory personnel to bring the Materials Source Data form and the inventory file up to date.

The Pit Locations and Potential Sources Map of Summit County has two symbol shapes to indicate the basic material types (gravel and borrow). The symbol shapes and their meanings are fully explained in detail in the legend on the map.

It should be kept in mind that certain pits may contain both gravel and borrow material, and this makes it very difficult in many cases to label the material collected as representative of the pit. This also leaves some doubt as to whether a pit should be called a gravel or a borrow pit. As a general rule, the most abundant or best material has been indicated. In such cases, the central file or the district file will contain completed test information which can determine a final designation.

Roy D. Tea, District 2 Materials Engineer; Norbert W. Larsen, former Geologist for the Central Laboratory; and J. Derle Thorpe, former Research Engineer for the Central Laboratory were instrumental in initiating the Materials Inventory, in establishing procedures for the functioning of the inventory, and for the format of this booklet.

Field work for the Summit County Inventory was begun in the middle of June, 1962, and was completed by the end of September of the same year. Mapping was done by District 2 Geologists G. Berndt Baetcke and A. Gene Sidler. Mapping was accomplished with the aid of aerial photos between Kimball Junction and Echo Reservoir. The remainder of the County was mapped directly on a highway base map on a 1"=1 mile scale.

Summit County -- General Geologic Setting

Summit County, in northeastern Utah, comprises approximately 1,850 square miles. It lies entirely within the Middle Rocky Mountains Physiographic Province. The county is located adjacent to the southwest corner of the state of Wyoming.

The central part of northern Utah, in general, has been termed a "transitional area." Here, two major north-south trending structural elements, the Idaho-Wyoming thrust belt and the Wasatch Mountains, merge with the east-west trending Uinta Mountain Arch. These uplifted areas are composed of, or flanked by, several thousands of feet of sedimentary strata that reveal a transition from miogeosynclinal sedimentation in the western portion of the region to shelf-type deposits in the east. For details of the areal geology, the reader is referred to the Northeast Quarter of the Geologic Map of Utah, compiled by W. L. Stokes, 1961. (1)

In Summit County, the Uinta Mountain Arch stands out as the major structural element. This east-west aligned arch is a unique and anomalous segment of the dominantly north-south trending Rocky Mountain chain. Approximately 35,000 feet of strata, ranging from Precambrian quartzites and phyllites in the mountainous core to Late Cretaceous on the outer flanks, are involved in the uplifted area. Structurally, the Uinta Mountains form a broad, asymmetrical anticline with the steepest dips on the north side. Since uplift of this range, erosion has removed an estimated 20,000 feet of strata from the top, leaving cuestas and hogbacks along the flanks. A part of this erosion was due to numerous glaciers during Pleistocene time.

The Wasatch Mountain Range, on the western margin of the county is another important structural element of the area. This feature is an ancient positive element, the core of which is composed of sharply folded and distorted metamorphic rocks of Precambrian age. Numerous open anticlines and synclines are present in the flanking Paleozoic and Triassic rocks. These folded strata have been elevated by faulting into the mountainous blocks that make up the Wasatch Range. For most of their length, the Wasatch Mountains are broken into two parallel ridges separated by mountain-rimmed valleys. Many streams cross one or both ridges in narrow, steep canyons. The largest, the Bear, Weber, and Provo Rivers all head near each other at the western end of the Uinta Mountains. During Pleistocene times the Wasatch Mountains also contained many small glaciers. Like the Uintas, the Wasatch Mountains have been modified greatly by this recent ice activity.

The Coalville Anticline, the third important structural element in the county, is an elongate, asymmetrical, double-plunging anticline rising to the east of Coalville. The east flank is overturned and broken by west-dipping faults into a complex imbricate structure. Structural configuration of the south plunge is largely obscured by unconformably overlapping rocks of the Knight conglomerate.

The reader is referred to the several listed theses on the geology of Summit County for detailed geologic information on the area concerned.

References

1. Northeast Quarter of the Geologic Map of Utah, compiled by W. L. Stokes, (1961), published by the Utah Geological and Mineralogical Survey.

2. Johnson, Melvin C., Areal Geology of the Wanship-Coalville Area, 1951.

3. Larsen, Kenneth W., The Areal Geology of the Rockport-Wanship Area, 1951.

4. Madsen, James Henry, Geology of the Lost Creek-Echo Canyon Area, Morgan and Summit County, Utah, 1959.

5. Morris, Elliot C., Geology of the Big Piney Area, Summit County, Utah, 1953.

6. Mount, Donald Lee, Geology of the Wanship-Park City Region, Utah, 1952.

7. Randall, Arthur G., Areal Geology of the Pinecliff Area, Summit County, Utah, 1952.

8. Schick, Robert Bryant, Geology of the Morgan-Henefer Area, Morgan and Summit Counties, Utah, 1955.

9. Stark, Norman P., Areal Geology of the Upton Region, Summit County, Utah, 1953.

10. Wood, William J., Areal Geology of the Coalville Vicinity, Summit County, Utah, 1953.

(2-10 are Master's Theses on file in the library of the University of Utah)

DESCRIPTION OF FORMATIONS

The Quaternary System

The Quaternary System is perhaps the most widespread and least well known in the geological column of Summit County. Quaternary sedimentary deposits lap up on the mountain flanks, and invade the canyons and major ravines in tongue-like flood plain deposits, terrace gravels, and alluvial fans. The close relationship of Quaternary deposits to the existing topographic features of the county clearly indicates that the major reliefs were already fairly well developed in late Tertiary times, but continued to be elevated intermittently throughout the Pleistocene and Recent epochs. Quaternary deposits constitute by far the most important source of highway materials.

Qc

Flowing Stream Channel Deposits

Gravel, Sand, and Silt

Unconsolidated fluvial gravel, sand, and silt in the main channel areas of the major streams. This material is usually cleaner than material in intermittent stream channels. Material has not been used from these deposits but they certainly are a potential source of mineral aggregate. Rock types are extremely variable, but resistant quartzite is usually predominant. Main deposits in the county are along the Weber River northwest of Echo Junction, Echo Canyon Creek northeast of Echo Junction, Chalk Creek, the Weber River south of Rockport Reservoir, and the Provo River along the southern boundary of the county.

Qfp

Flood Plain Deposits

Gravel, Sand, and Silt

Unconsolidated, fine-textured fluvial deposits in the present flood plain of the Weber River immediately south of Oakley. One borrow pit, operated by Summit County, has been developed in this deposit. Most of the flood plain has extensive agricultural development on it which would tend to hinder further pit operations, but it must be considered a potential mineral aggregate source.

Qa

Alluvium

Sand, Silt, and Clay

Unconsolidated, fine-textured alluvial deposits occuring on gently sloping to nearly level surfaces in the floors of valley basins. Most of these surficial materials were deposited as sediments brought down by sheet wash from higher alluviated areas. These deposits are a potential source of borrow only.

Qls

Landslide Deposits

Gravel, Sand, Silt, and Clay

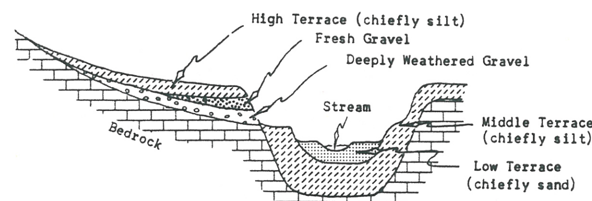
Unconsolidated, varied-textured slump material which has slid downward from a cliff and at the same time rotated backward on a horizontal axis. This phenomena often happens wherever massive sedimentary strata, usually sandstones or limestones, rest upon weak clay or shale formations and a steep cliff tends to be formed by erosion. The main area of landslide deposits in the county occurs about two miles north of Oakley. Smaller areas throughout the county have been mapped as alluvium. Landslide material is a potential source of borrow only.

Qt

River Terrace Deposits

Gravel, Sand, and Silt

Unconsolidated and semi-consolidated coarse to medium-textured alluvial deposits occuring in elevated surfaces above the present flood plains. Most stream valleys contain remnants of dissected fills of alluvium, some of which form terraces. The stratigraphic relations of these fills imply that the streams have gone through alternating phases of erosion and deposition. Typical relations of alluvium in stream terraces are shown in the following diagram:



Most of the best gravel pits in Summit County are in terrace deposits. Tremendous quantities of excellent gravels can be obtained from the large terraces along the Provo River immediately south and southeast of Francis. Most operating pits between Wanship and Coalville are in river terrace deposits. Large quantities of good gravels are also obtainable from terraces along the Weber River northwest of Echo Junction. Many terraces, however, are a potential source of borrow material only due to high silt content.

Tgs

High level Gravel Surfaces

Gravel, Silt

These are the older gravel covered surfaces which may be elevated terraces or old pediment surfaces. Material in these deposits is unconsolidated and semi-consolidated and is commonly quite calcareous on the surface. A thick "caliche-hardpan" often occurs just below the surface veneer. These deposits have not been sampled in this inventory, but probably would be potential sources of borrow only. Three fair-sized deposits occur at the mouth of Brown's Canyon. A large gravel surface comprising approximately five square miles has been mapped one mile northwest of Pine Cliff. The age of these surfaces is somewhat in doubt. They are believed to be Tertiary features and are included with the Quaternary System in this report for illustration convenience only.

Qaf

Alluvial Fan Deposits

Gravel, Sand, Silt, and Clay

Unconsolidated material at the mouths of canyons. Coarser fractions occur at the mouth of the canyons and finer fractions, deposited as "sheet wash" and occasional "flash" run-off, occur toward the valleys. Alluvial fan deposits, hence, are usually poorly sorted and much fine material must be wasted in order to make gravel. Most unmined fans should be considered as potential borrow sources only unless conditions demand their use as gravel sources.

Qgm

Glaciated Ground, Undifferentiated Moraines

Gravel, Sand, Silt

Quaternary glacial deposits in Summit County are found in two areas. Most are in the Uinta Mountains. A smaller expanse of glacial material is found immediately west of Park City in the Wasatch Range. These deposits consist of bulky terminal and lateral moraines left at the mouths and along the margins of the major canyons in the two mentioned areas. These morainal deposits are often accompanied by deep valley trains and thick fan-like accumulations of outwash cobbles and gravels. The oldest moraines are represented by large, scattered, deeply-weathered residual erratic blocks. Intermediate age moraines retain some of their original topographic form, though deeply trenched by streams. In these, boulders are scarce, and weathering has proceeded to depths of several feet. The younger moraines have had relatively little weathering or topographic modification of their original forms. These are the best potential gravel sources. Morainal material in the Uinta Mountains is comprised predominantly of brown and purple quartzite fragments (ranging in size from several inches to over eight feet in diameter) and a sand matrix. Glacial deposits were used almost exclusively for construction of Highway 150 through the Wasatch National Forest.

Qgo

Glacial Outwash

Gravel, Sand, Silt

These deposits contain both fine and coarse material laid down by streams beyond the margins of the glaciers. Sorting is much better in these deposits than in morainal deposits but the greater amount of fines makes outwash a potential borrow source only. One fair-sized area of this type material is found within the county at the confluence of Shingle Creek and the Provo River.

Tertiary Igneous Rocks

Intrusive Rocks

Intrusive igneous rocks, widely distributed in western Utah, were mapped in four localities in Summit County.

Tbi

Basic Intrusives

Approximately four miles north of the eastern limits of Oakley along Whites Creek is a small exposure of dark green, even-grained diorite dike rock. Plagioclase, hornblende, and biotite are the recognizeable minerals. A similar-appearing rock outcrops one and one-half miles east of Francis at the mouth of Moon Canyon. This rock type would be a potential borrow source.

Tpi

Porphyritic Intrusions

In two localities, south and southwest of Park City along the county line, outcrops occur of a dark greenish-gray dike rock with lamprophyric texture. Phenocrysts of phlogopite make up about 20 per cent of this rock and these are embedded in a fine crystalline groundmass comprised mostly of augite. The rock weathers to a dark purplish-gray color and sponge-like appearance due to the removal of phenocrysts. This rock type would also be a potential borrow source only.

Extrusive Rocks

Tap

Tertiary Andesitic Pyroclastics

An area exceeding 200 square miles surrounding Park City, some of which is in Summit County, contains extrusive andesitic flows and pyroclastics. These rocks dip gently to the east and have been deposited on an erosion surface of some relief. Gray and yellowish-gray tuffs, a conspicuous portion of the volcanic sequence near Park City, resemble a fine sandstone which is gradational to argillaceous rock containing larger grains. In the latter type, phenocysts of andesine, hornblende, and biotite are identifiable. A large pit in this material has been developed one mile southeast of the junction of Route 40 and the Brown's Canyon road. Gravel has been made from this pit for State use. A small borrow pit had been worked in extrusive rocks along the Brown's Canyon road about two miles northeast of the junction with Highway 40. In Summit County these flows and pyroclastics of andesitic composition cover most of the area bordered by Interstate 80, Route 40, and the Weber River. This area constitutes a potential gravel and borrow source.

Tertiary Sedimentary Rocks

Tf

Fowkes Formation

This formation consists of light colored (white to pink) rhyolitic tuff and ash beds containing abundant glass shards. Main areas of Fowkes occur west of Route 65 (southwest of Henefer) and a 12-mile long belt approximately two miles southeast of Wahsatch. Due to the softness of the material, this formation is not considered a potential aggregate source.

Tk

Knight Conglomerate

The predominant geologic formation in the northern half of Summit County is a series of deep red conglomerate, sandstone, and shale beds. Compositions of these beds is far from being uniform. Pebbles, cobbles, and boulders in the conglomerate are predominantly Paleozoic quartzite in places, and Paleozoic limestone in other localities. In the Coalville area, the conglomerates have red and yellow colors and are poorly sorted. Conglomeritic fragments range in size from grit to 6-foot boulders. A calcareous cement binds these fragments. The predominant rock type of conglomerate pebble is a buff to pinkish quartzite. However, limestone, sandstone, and chert pebbles also occur.

Blasting would naturally be required if this rock type is used for road aggregate. However, alluvial fans which have developed primarily from the Knight Conglomerate are a potential source of gravel. This is especially true in the canyons east of Route 189 between Wanship and Coalville. Chalk Creek Canyon also contains innumerable fans developed from this formation.

Kec

Echo Canyon Conglomerate

Northeast and northwest from Echo Junction, a predominantly conglomeritic sequence occurs which is definitely older than the Knight formation. (4) This has been called the Echo Canyon Conglomerate. The lower half of this sequence contains interbedded red, gray, and buff conglomerates, sandstones, shales, and siltstones. The upper half is a massive, reddish conglomerate with some minor thin beds of gray to red shale and siltstone. Many small alluvial fans have developed from this formation along Route 30-S northeast from Echo Junction. These may well prove potential gravel sources. Fresh outcrops of this rock type, however, would have to be blasted before its use as an aggregate.

Kw

Wanship Formation

The contact between this formation and the overlying coarse conglomerates of the Echo Canyon formation is easily seen due to the contrasting gray, pea-size conglomerates and sandstones of the Upper Wanship formation. In general, throughout the county, this formation consists of a sequence of conglomerates, sandstones, and shales. Pebbles and boulders in the conglomerates are principally tan quartzites and cherts. Some gray limestone pebbles occur. The sandstones are tan in color, fine-grained, and contain abundant chert, limestone, and mica fragments. Shale beds are tan to gray in color. Some shale beds are quite carbonaceous and others contain abundant iron-concretions. A good exposure of this formation is found in Cherry Canyon, immediately east of Wanship. Alluvial fans developed from this formation may be considered a potential borrow source only.

Kf

Frontier Sandstone

This formation is exposed primarily at the southeastern end of the Rockport Reservoir, in Big Bear Hollow and Tollgate Canyon north of Kimball Junction, and in the Coalville Anticline. It consists of a thick series of interbedded gray to buff sandstones; gray, bluish, and red shales; and some pebble and cobble conglomerates. The sandstones are massive, usually cross-bedded, and form prominent ridges. Most sandstone beds are extremely friable which would exclude their use as road aggregate. The shale beds are soft and conglomerate layers thin, hence the Frontier Formation should be ruled out as a materials source.

Ka

Aspen Shale

This rock outcrops in a thin band north of Interstate 80 between Wood Hollow and the mouth of Alexander Canyon, and between the head of Pine Creek Canyon and the mouth of Buder Creek Canyon. It is also exposed in the Coalville Anticline and near Pine Cliff. The Aspen actually is a sequence of sandstone, shales, coals, and bentonite beds. Bentonite beds and teleost fish scales present in the shale beds are characteristic of the Aspen formation. The shales are medium and dark gray, thin-bedded, and both arenaceous and siliceous varieties are present. Shales, which are the predominant rock type, probably represent the potential materials source from this formation.

Kbr

Bear River Formation

This formation consists of carbonaceous shales and sandstones. Outcrops are limited to the vicinity east and northeast of Pine Cliff in Summit County. Due to the remoteness of these exposures and the accessibility of more favorable rock types even in the areas in which this formation exists, it should be ruled out as a potential aggregate source.

Kk

Kelvin Conglomerate

This formation, in general throughout Summit County, can be separated into two parts. A lower member consists of interbedded sandstones, shales, and three prominent conglomerate beds. These latter beds are reddish in color and contain well-rounded quartzite and chert pebbles and boulders. Two hogback Kelvin conglomerate ridges are present between Cherry Canvon and Pecks Canyon (northeast of Wanship) and contribute material to alluvial fan development in canyons in this area. These fans constitute good potential borrow and perhaps gravel sources.

Jurassic Rocks

Jm

Morrison Formation

Small exposures of Morrison rocks outcrop northwest and northeast of Peoa. Another small outcrop occurs one mile northwest of Rockport Reservoir. This formation in Summit County consists of a sequence of white to purple interbedded, friable sandstones and variegated silts. Some thin-bedded, chert pebble conglomerates occur near the top of the unit. Since such minor expanses of Morrison occur in the county, and much of this is friable sandstone, it should not be considered a potential aggregate source.

Jtc

Twin Creek Limestone

Many small exposures of Twin Creek limestone outcrop throughout the central portion of the southern half of the county. It is a pale gray to blue-gray marine limestone and is usually thin-bedded. The rock weathers to an almost white color. Red siltstones and sandy shales occur in the upper portion of the formation. The limestones in this formation would certainly be a good potential aggregate source but quarrying operations, naturally, would be necessary. A borrow pit has been developed in fractured Twin Creek limestone approximately three miles northeast of Oakley along the Holiday Park road.

Jn

Nugget Sandstone

Nugget sandstone occurs in most areas where Twin Creek limestone is exposed--namely throughout the central portion of the southern half of the county. The rock is usually salmon colored, medium-grained, well-cemented, and highly cross-bedded. It is a persistent ridge former wherever it outcrops. Due to the lack of alluvial fan development on this formation it is not considered a potential aggregate source with the exception of one small fan in the northeast end of Oakley, which contains primarily Nugget material and can be used as borrow.

Undivided Jurassic Rocks

As in the case of other Jurassic outcrops, most of these undivided formations outcrop throughout the central portion of the southern half of the county. These include mainly the San Rafael group and are made up primarily of greenish, marine limestones, shales, and sandstone, and brownish-red sandstones and shales. The Jurassic Preuss formation is also present immediately north of Oakley. It is mainly a red siltstone and is shown on the map by the symbol Jp. It has been unintentionally omitted from the map legend. These rocks are not considered a good potential source of road materials in Summit County.

Triassic Rocks

Tru

Undifferentiated Triassic Rocks

These include Upper Triassic rocks and are chiefly red shales, sandstones, and conglomerates. They outcrop about one and one-half miles north of Holiday Park and, due to their location, should not be considered an important source of aggregate.

Trc

Chinle Formation

This formation occurs only in small scattered areas throughout central portions of the southern half of the county. It usually contains variegated reddish-brown siltstones, mudstones, and soft shales. It is not a potential materials source.

Tra

Ankareh Formation

This formation, occuring only in the southern portion of the county, contains red siltstones, shales, and soft sandstones. It usually is a slope-former and is not a potential aggregate source.

Trt

Thaynes Formation

This formation contains most of the Triassic rocks outcropping in Summit County. Large areas are exposed immediately west of Kimball Junction and west of Park City (the type section of this formation is in Thaynes Canyon west of Park City). A sizeable exposure is seen one mile east of the northern limits of Oakley. The Thaynes is usually divided into three members. A "lower lime" member which is a brown to blue-gray limestone alternating with thin beds of calcareous sandstones and shales. This member forms cliffs and ridges. A "middle red" member is made up of thin-bedded, red, sandy shales and sandstones and is a slope-former. An "upper lime" member contains buff to gray limestones and interbedded gray to brown sandstones and shales. This member is a prominent cliff and ledge-former. The lower and upper lime members are potential aggregate sources.

Trw

Woodside Shale

This formation usually outcrops with Thaynes exposures. It consists of a dark red, sandy, ripple-marked shale and occasional thin beds of red sandstone. The formation is usually a slope-former due to its lack of resistance to erosion. It is not considered to be a likely source for aggregate.

Ppc

Park City Formation

This formation, named for the Park City district where it is exposed, occurs in scattered patches throughout the southern half of the county. It consists of upper and lower members of gray and black cherty limestones and sandstones, separated by a middle dark phosphatic shale member. It is a favorable formation for preparing aggregate materials if needed.

Pw

Weber Formation

This formation consists chiefly of reddish-brown sandstones and white and buff quartzites with a few thin interbedded cherts and limestones. The upper boundary of the Weber is an unconformity with the overlying Park City formation, but at its base is gradational with the Morgan formation. A large alluvial fan formed primarily of Weber material was mapped one mile east of the junction of roads 190 and 184 between Oakley and Kamas. This is a potential gravel source. In other exposures, the formation would be favorable for aggregate with the necessary preparation. Rock talus slopes are usually associated with this formation throughout the county, and are good aggregate sources.

Pm

Morgan Formation

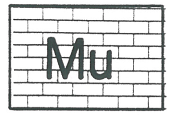
This formation is predominantly an earthy, white and pink sandstone and interbedded shales and limestones. The Morgan is usually present at all Pennsylvanian outcrops throughout the county. A large alluvial fan has developed from Morgan material one-half mile south of the previously-mentioned Weber fan between Oakley and Kamas. This is a potential gravel source. Other outcrops of Morgan would be favorable aggregate sources with the necessary preparations.

PMmc

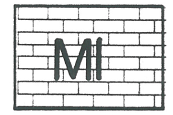
Manning Canyon Formation

This formation outcrops only in small exposures in the county. It usually is a dark-colored marine shale, claystone, siltstone, and limestone. It is not considered a potential materials source.

Mississippian Rocks



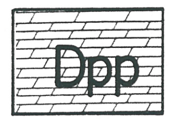
Undivided Mississippian Rocks



Undivided Lower Mississippian Rocks

Mississippian rocks in Summit County consist primarily of thin-bedded, cherty, fossiliferous, blue-gray limestones. Thin black shale members containing phosphatic oölite occur locally. The major outcrops of these rocks occur immediately west of the most westwardly extent of Precambrian rocks in the Uinta Mountains throughout the southern half of the county. No pits have been developed in Mississippian rocks within the county, but they represent a good potential aggregate source.

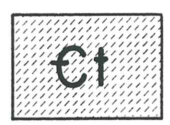
Devonian Rocks



Pinyon Peak Formation

Small patches of Pinyon Peak crops out between Precambrian and Mississippian rocks in the southern half of the county. The formation consists of limy siltstones and dolomitic limestones, but exposures are so small that they cannot be considered a suitable materials source.

Cambrian Rocks



Tintic Quartzite

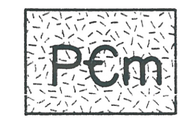
One small outcropping of Tintic quartzite occurs in Summit County at the head of Cedar Hollow Creek which is approximately six miles due east from Francis. The Tintic consists chiefly of light gray to pink quartzites. It is medium to coarse grained and is well cemented with silica. Iron oxide coating often gives it a reddish color. Due to the location of the exposure, this formation cannot be considered a potential materials source in the county.

Precambrian Rocks

Precambrian rock exposures in Summit County are confined to the Uinta Mountains in the eastern half of the county. Here, they are exposed in the core of the uplifted Uinta Arch. Extensive glacial deposits in the Uintas, however, far outweigh these Precambrian rocks as potential highway aggregate sources.

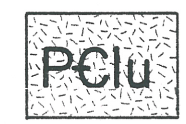
Red Pine Shale

This formation consists of thin-bedded, brown, greenish-brown, and gray micaceous shales. Borrow material could be quarried from these rocks.



Mutual Formation

This is chiefly a massive, purplish quartzite with interbedded brown and gray shales and conglomerates. Abundant glacial material in the immediate vicinity of Mutual outcroppings would tend to exclude its use as aggregate.



Lower Uinta Group

These rocks include mainly brown quartzites and quartzitic sandstones. However, several brown to gray shale and conglomerate beds occur in this group near Highway 150. A Forest Service pit at the foot of Bald Mountain is in a thick shale member of this rock group. Material from this pit has been used as road aggregate for Forest Service roads in the area. Shale exposures in other localities would represent potential aggregate sources, but the ease of obtaining glacial material would rule out the quarrying of quartzite as aggregate.

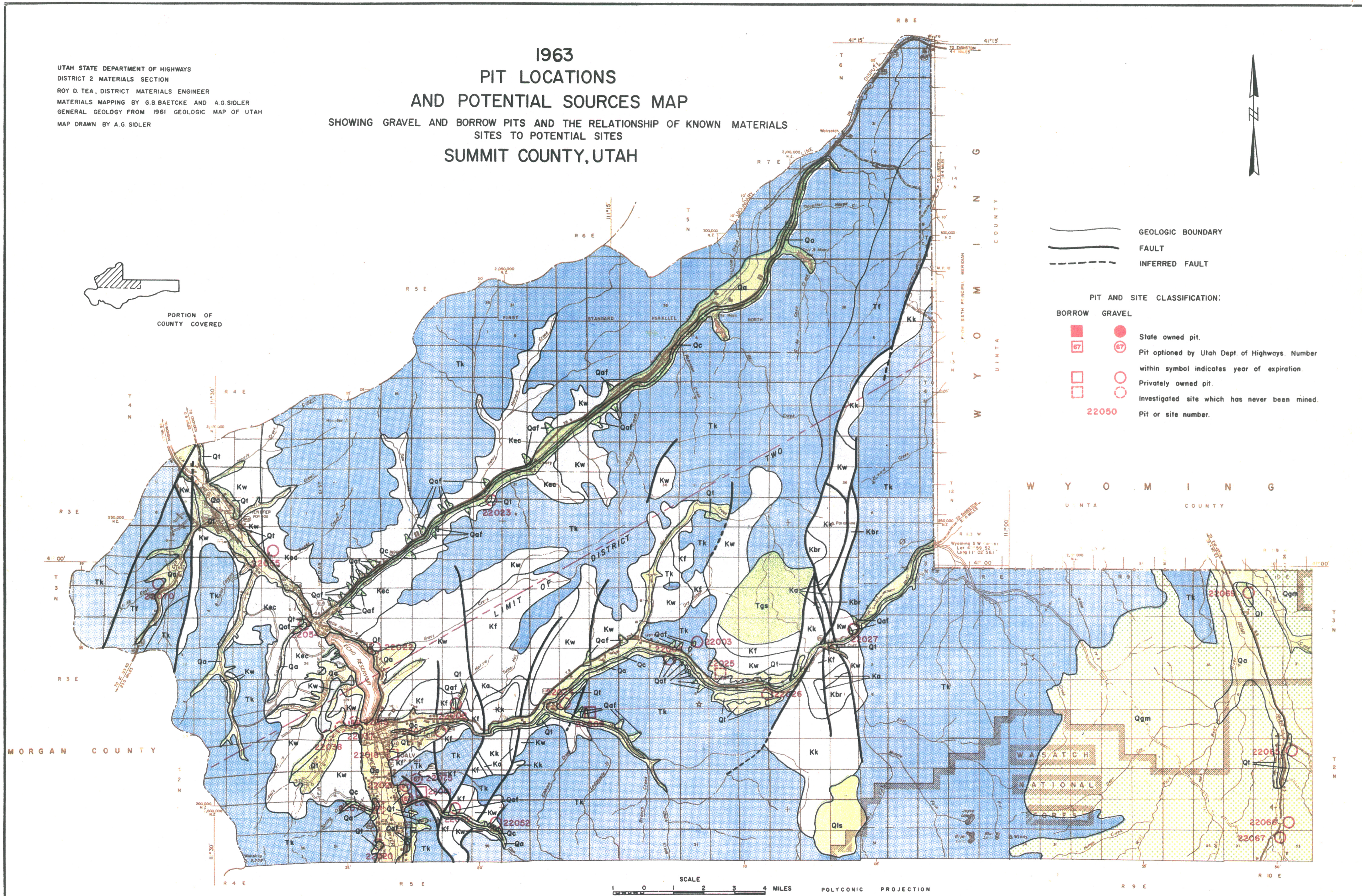
T E S T D A T A S H E E T

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
	Legal Description									Kind and Percent of Material				REPRESENTATIVE SAMPLE																	
																		Sieve Analysis % Passing (After Crushing to 1" Max.)							Immersion Compression Avg. P.S.I.			Sodium Sulphate Loss			
																									Lime						
Pit or Site Number	Township	Range	Section	Quarter Section	Quarter of Quarter Section	P = Private C = Commercial Co = County F = Federal S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	1"	3/4"	1/2"	No. 4	No. 10	No. 200	A.A.S.H.O. Classification	wo/	w/	Depth of Overburden (ft.)	+4	-4	Abrasion 500 Rev.	Thickness of Material
22001	2N	5E	22	SW	NE	P	R. Crittenden	Borrow	32,000	34.0	5.5	23.5	37.0	Cut Bank	½-10	20.2	N.P.	84.6	80.4		69.0	66.0	37.0	A-4(0)			.5				9.5
22002	2N	5E	26	NW	N½	P	M. Crittenden	SG(C)	16,000					Cut Bank	2-7	15.8	N.P.	100.0	99.3	85.4	57.4	49.5	12.6				2			35.6	5
22003	3N	7E	30	SE	NW	P	H. J. Newton & Sons Sheep Co.	BG SG(A,B,C)	800,000					Cut Bank	1-8	18.3	N.P.	100.0	92.2	65.6	51.4	42.2	9.9				1			25.3	30
22004	3N	6E	36	N½		P	J. H. Boyer	BG SG(A,B,C)	200,000					Cut Bank	2-8	18.8	N.P.	100.0	85.3	76.0	45.7	27.9	9.1				2			26.1	30
22005	1S	5E	20	SW	S½	P	A. & D. L. Shields	Borrow	6,400	60.7	11.4	12.7	15.2	Cut Bank	2-6	31.1	6.1	71.6	63.8		45.9	39.3	15.2	A 2-4(0)			2				4
22006	1S	5E	24	NE	NE	P	P. Marchant	Gravel	2,000,000					Cut Bank	2-12	24.7	N.P.	100.0	95.0	82.9	60.3	50.6	20.3				2			38.1	30
22007	2S	6E	4	NW	NW	Co	Summit Co.	Borrow	10,000					Cut Bank	2-9	25.1	N.P.	100.0	87.8	66.6	36.5	26.7	11.4				2			20.9	10
22008	2N	5E	2	SW	SE	P	Snyder	BG SG(A,B,C)	24,000					Cut Bank	3-11	18.5	N.P.	100.0	91.2	74.8	47.4	36.5	9.2				3			30.2	15
22009	2N	6E	9	NE	N½	P	G. G. & F. L. Blonguist	Borrow	500,000					Cut Bank	3-10	17.6	N.P.	100.0	94.7	83.2	61.4	52.5	22.0				3			25.6	60
22010	1S	6E	16	N½		P	A. J. Reed	Borrow	7,000					Cut Bank	1-9	26.7	18.4	100.0	88.5	69.3	44.2	39.2	24.6				1			23.0	8
22011	2S	6E	29	SE	S½	S	State of Utah	BG SG(B)	96,000					Cut Bank	1-11	18.9	N.P.	100.0	87.5	64.9	37.0	29.2	5.6				1			35.3	15
22012	1S	4E	18	SW	SW	P	W. & E. White	Gravel	75,000					Cut Bank	0-10	19.9	N.P.	100.0	93.7	18.6	47.9	37.8	6.9		85	130	5	24.8	10.8	36.5	20
22013	1N	5E	21	NW	N½	P	K. Siddoway	Gravel	600,000					Back Hoe	0-10	19.1	N.P.	100.0	92.8		50.7	43.7	17.0		205	283	0-2	0.9	1.6		50
22014	1N	5E	4	E¼		P	R. Pace	Gravel	300,000					Cut Bank	2-7	19.2	N.P.	100.0	90.6	72.8	41.7	33.7	4.5				2			22.5	25
22015	2N	5E	8	SW	NW	P	J. Rees	Gravel	Millions					Cut Bank	5-20	18.2	N.P.	100.0	88.9	69.2	40.8	35.6	12.1				5			19.4	100
22016	1N	5E	9	SE	NW	P	H. Pace	Gravel	1,000,000					Cut Bank	8-13	17.2	N.P.	100.0	88.8	67.3	41.7	33.8	10.8		163	244	2	7.4	3.1	31.9	30
22017	2N	5E	10	SE	SE	P		Gravel	300,000					*													0-2				
22018	2N	5E	16	SW	NE	P	L. Keyes	Borrow	200,000	0.1	1.0	34.7	64.2	Back Hoe	2-5	29.1	13.1	100.0				99.9	64.2	A-6-(7)			1½				10
22019	2N	5E	21	E½		P	Crittenden	Gravel	300,000					*													1				20
22020	2N	5E	32	SE	NE	P	Bradbury	Gravel	25,000					*													0-1				30
22021	2N	5E	21	SE	NW	P	Judd & Staley	Gravel	120,000					Cut Bank	0-15	18.4	N.P.	100.0	90.4	66.2	35.7	28.1	8.3				0-2			32.0	20
22022	3N	5E	32	NE	W½	P		Gravel	1,600,000					Cut Bank	2-12	16.4	N.P.	100.0	89.1	71.0	44.1	35.0	11.3				2			28.4	35
22023	3N	5E	1	N½		P		Borrow	700,000					*													2				100

* These localities could not be sampled during the initial inventory. Drilling is recommended in these areas.

LOCATION: Pit or Site Number	Legal Description: Township	Range	Section	Quarter Section	Quarter of Quarter Section	OWNERSHIP: P = Private, C = Commercial, Co = County, F = Federal, S = State	Owner	MATERIAL: Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material: Gravel	Coarse Sand	Fine Sand	Clay and Silt	TEST DATA: Representative Sample: Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis Percent Passing: 1"	3/4"	1/2"	No. 4	No. 10	No. 200	A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I.: Lime wo/	Lime w/	Depth of Overburden (ft.)	Sodium Sulphate Loss: +4	-4	Abrasion 500 Rev.	Thickness of Material
22024	2N	6E	14			P		Gravel	Millions					*													3				90
22025	2N	7E	5	NW	NW	P		Borrow	500,000					Cut Bank	0-8	23.1	N.P.	100.0	93.6	81.0	61.9	53.7	23.8				0			38.1	25
22026	2N	7E	14	S¼		P		BG SG(B)	1,000,000					Cut Bank	2-10	20.7	N.P.	100.0	90.1	67.9	38.2	29.0	6.8				2			24.6	20
22027	3N	7E	25	SE		P		BG SG(B)	50,000					Cut Bank	1-7	18.3	N.P.	100.0	90.3	72.6	44.8	33.9	7.6				1			29.3	20
22028	2S	6E	32	E½		P		Borrow	1,000,000					Cut Bank	1-7	22.9	N.P.	100.0	91.7	74.9	51.6	45.4	16.9				1-2			31.3	30
22029	2S	6E	33	SW	SW	P	Forbes Construction Co.	Gravel	1,000,000					*																	
22030	3S	6E	2	SW		P		BG SG(B)	1,000,000					Cut Bank	2-14	16.4	N.P.	100.0	90.9	70.3	43.9	36.7	8.6				2			31.1	40
22031	1S	6E	20	W½		P	F. O. Marchant	SG(C)	100,000					Cut Bank	2-8	20.3	N.P.	100.0	91.5	76.3	50.7	40.7	12.9				2			34.4	12
22032	1N	7E	28	SE	S½	P		SG(C)	1,000,000+					Cut Bank	1-13	22.0	N.P.	100.0	92.8	75.3	46.0	33.9	11.8				1			27.8	15
22033	1N	7E	31	SE	S½	P		SG(C)	1,000,000+					Cut Bank	2-12	21.3	5.5	100.0	93.0	77.5	51.7	36.9	10.7				2			25.8	20
22034	1N	7E	27	SE		P		BG SG(A,B,C)	1,000,000+					Cut Bank	2-12	19.1	N.P.	100.0	93.3	77.5	51.6	38.2	8.2				2			25.8	20
22035	3S	6E	11	E½		P		Borrow	1,000,000+					Cut Bank	2-14	19.2	N.P.	100.0	94.7	84.4	67.3	60.1	10.4				2			29.7	20
22036	3S	7E	16			P		Borrow	Millions					Cut Bank	3-18	18.2	N.P.	100.0	92.7	74.4	47.3	37.2	7.4				3			32.7	20
22037	2N	5E	7	N½		P		Gravel	Millions					Cut Bank	4-12	17.5	N.P.	100.0	88.8	61.9	34.3	27.8	10.2				4			27.5	35
22038	2N	5E	7			P		Gravel	Millions					Cut Bank	3-13	19.1	N.P.	100.0	90.9	71.0	42.7	34.1	10.7				3			32.0	30
22039	1S	5E	4	NE	SE	P		SG(C)	50,000					Cut Bank	4-13	17.3	N.P.	100.0	91.3	74.5	49.2	38.9	11.5				4			33.4	20
22040	1S	6E	28	SE	SE	P		BG SG(B)	200,000					Cut Bank	3-9	22.3	N.P.	100.0	93.5	74.2	42.6	31.6	9.9				3			27.4	20
22041	1S	4E	19	NE	N½	P		SG(C)	100,000					Cut Bank	4-13	19.3	N.P.	100.0	93.5	76.9	49.6	39.9	11.8				4			44.5	10
22042	1S	3E	1	S¼		P		Borrow	200,000					*													3				15
22043	1S	3E	34			P		Borrow	45,000					*													2				8
22044	1S	4E	35	SE	S½	P		Gravel	180,000					Cut Bank	3-13	25.3	5.4	100.0	92.7	77.9	52.8	40.7	11.7				3			27.5	12
22045	2S	4E	2	NE		P		Gravel	70,000					*													3				8
22046	1N	5E	17	W½		P		Borrow	60,000					*													2				12
22047	1N	5E	8	E¼		P		Borrow	1,000,000	8.1	15.2	42.3	34.4	Cut Bank	2-12	21.9	N.P.	100.0	100.0	100.0	100.0	91.9	34.4	A-2-4(0)			2				20
22048	1N	5E	5-8			P		Borrow	35,000					*													4				20
22049	1N	5E	16	N½		P		Borrow	200,000					*													4				25
22050	1N	5E	11	N¼		P		Borrow	300,000					Cut Bank	2-7	19.2	N.P.	100.0	91.2	74.0	49.9	43.4	15.6				2-4			32.5	15-30

LOCATION						OWNERSHIP		MATERIAL						TEST DATA																	
Pit or Site Number	Legal Description					P = Private C = Commercial Co = County F = Federal S = State	Owner	Use of Material	Present Estimated Quantity cu. yds.	Kind and Percent of Material				Representative Sample										A.A.S.H.O. Classification	Immersion Compression Avg. P.S.I.		Depth of Overburden (ft.)	Sodium Sulphate Loss		Abrasion 500 Rev.	Thickness of Material
	Township	Range	Section	Quarter Section	Quarter of Quarter Section					Gravel	Coarse Sand	Fine Sand	Clay and Silt	Type Sample	Depth of Sample (ft.)	Liquid Limit	Plasticity Index	Sieve Analysis % Passing (After Crushing to 1" Max.)							Lime						
																		1"	3/4"	1/2"	No. 4	No. 10	No. 200		wo/	w/		+4	-4		
22051	1N	5E	15	N¼		P		Borrow	200,000					Cut Bank	1-7	20.1	N.P.	100.0	91.4	76.4	57.7						1-3			33.8	10-30
22052	2N	5E	25	S½		P		Borrow	150,000					*													3				3-12
22053	2S	5E	6	E¼		P		Gravel	30,000					*													2				20
22054	3N	4E	25	N½		P		SG(C)	300,000					Cut Bank	2-8	20.0	N.P.	100.0	90.7	74.5	45.2	34.2	12.6				2			30.4	6-18
22055	3N	4E	11	SW		P		BG SG(A,B,C)	120,000					Cut Bank	3-9	14.9	N.P.	100.0	91.0	71.8	45.9	36.3	5.4				3			24.5	18
22056	2S	7E	20	SW	NW	F		BG SG(B)	20,000					Cut Bank	1-6	13.8	N.P.	100.0	91.0	72.0	43.3	35.0	5.0				0-1			46.2	25
22057	3S	7E	1	NE	NW	F		BG SG(A,B,C)	10,000					Cut Bank	0-5	13.7	N.P.	100.0	92.2	75.4	46.8	34.4	5.0				0			22.1	15
22058	3S	8E	3	SE	NE	F		BG SG(B)	5,000					Cut Bank	0-4	15.0	N.P.	100.0	90.0	67.3	33.4	24.3	6.0				0			38.3	3-5
22059	3S	8E	2	NE	NE	F		BG SG(B)	500,000					Stock Pile	0-2	15.7	N.P.	100.0	90.9	71.8	39.4	29.1	7.3				0			40.0	30
22060	2S	9E	23	SE	NE	F		BG SG(A,B,C)	15,000					Cut Bank	0-4	13.9	N.P.	100.0	91.9	74.9	45.0	33.1	6.8				0			26.1	6
22061	2S	9E	17	NE	NW	F		Borrow	2,000					Cut Bank	0-4	11.7	N.P.	100.0	95.1	83.2	64.7	57.8	18.2				0			36.7	15
22062	2S	9E	8	NE	NW	F		Borrow	5,000					Cut Bank	0-6	13.9	N.P.	100.0	93.2	82.0	62.4	53.0	15.2				0-1			24.6	8
22063	1S	9E	34	SE	NW	F		Gravel	500					Cut Bank	0-2	16.0	N.P.	100.0	90.1	71.4	42.0	33.2	14.2				0			37.9	6
22064	1S	9E	34	SE	NE	F		Borrow	10,000					*	S	H	A	L	E		P	I	T				0				30
22065	2N	10E	16	NW	SE	F		Gravel	10,000					Cut Bank	0-5	19.1	N.P.	100.0	92.4	77.1	56.0	46.4	3.2				0			22.9	5
22066	2N	10E	29	SE	NE	F		SG(C)	5,000					Cut Bank	0-4	16.7	N.P.	100.0	94.0	82.7	60.7	48.2	12.2				0-1			23.6	5
22067	2N	10E	32	NE	NE	F		BG SG(B)	30,000					Cut Bank	0-5	16.2	N.P.	100.0	90.5	71.1	43.7	31.8	3.7				0			23.5	15
22068	1N	9E	25	NW	NW	F		BG SG(B)	10,000					Cut Bank	0-6	15.2	N.P.	100.0	90.5	70.5	41.3	31.9	4.8				0			33.3	30
22069	3N	10E	19	NE	NW	P	Burt-Miller Ranch	Gravel	100,000					Cut Bank	0-6	17.1	N.P.	100.0	89.1	68.0	41.1	32.7	6.6				0			27.7	30
22070	3N	3E	18	SE	SE	P		SG(A,B,C)	1,000,000					Cut Bank	0-6	17.5	N.P.	100.0	91.0	71.3	47.1	38.9	6.1				0-1			25.9	100
22071	1S	4E	14	E½		P	A. Pace	Gravel	300,000					Cut Bank	4-10	24.2	N.P.	100.0	92.1	79.8	49.8	39.7	11.2				1			35.1	15
22072	1S	7E	6	NW	NW	P		Borrow	5,000					*	S	H	A	L	E		P	I	T								
22073	1N	7E	31	NW		P		Borrow	5,000					*	S	H	A	L	E		P	I	T								
22074	2N	5E	29	E½		P	R. Rees	Borrow	500,000	60.9	4.3	14.6	20.2	Drill Hole		22.7	N.P.	78.6	73.5		42.4	39.1	20.2	A-1-6(0)			0				15
22075	2N	5E	21	NE	E½	P	Staley	Gravel	20,000					Back Hoe	2-7	20.9	N.P.	100.0	90.7	74.1	43.6	35.0	2.9								
22076	1S	6E	20	NE		P	Frazier	Gravel	300,000					*													1				20
22077	1N	4E	24	SE	NE	P	F. M. Bates	Gravel	170,000					Back Hoe	0-10	19.4	N.P.	100.0	89.6	65.4	32.6	26.1	7.9		163	207	1	5.7	5.1	32.0	15


UTAH STATE DEPARTMENT OF HIGHWAYS
DISTRICT 2 MATERIALS SECTION
ROY D. TEA, DISTRICT MATERIALS ENGINEER
MATERIALS MAPPING BY G.B. BAETCKE AND A.G. SIDLER
GENERAL GEOLOGY FROM 1961 GEOLOGIC MAP OF UTAH
MAP DRAWN BY A.G. SIDLER
1963
PIT LOCATIONS
AND POTENTIAL SOURCES MAP
SHOWING GRAVEL AND BORROW PITS AND THE RELATIONSHIP OF KNOWN MATERIALS SITES TO POTENTIAL SITES
SUMMIT COUNTY, UTAH
PORTION OF COUNTY COVERED
GEOLOGIC BOUNDARY
FAULT
INFERRED FAULT
PIT AND SITE CLASSIFICATION:
BORROW
GRAVEL
State owned pit.
Pit optioned by Utah Dept. of Highways. Number within symbol indicates year of expiration.
Privately owned pit.
Investigated site which has never been mined.
22050
Pit or site number.
WYOMING
UINTA COUNTY
MORGAN COUNTY
WASATCH NATIONAL FOREST
LIMIT OF TWO DISTRICT
SCALE
0 1 2 3 4 MILES
POLYCONIC PROJECTION

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1963
PIT LOCATIONS
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SHOWING GRAVEL AND BORROW PITS AND THE RELATIONSHIP OF KNOWN MATERIALS SITES TO POTENTIAL SITES

SUMMIT COUNTY, UTAH